

## Soil Issues Related to Pipeline Construction

The following statement is summary of information compiled by Dr. Tom Fenton and based on his 58 years of experience as a soil scientist and several consulting jobs related to pipeline construction. For his full analysis, refer to the resources page at nobakken.com or email contact@nobakken.com.

The primary issue in the construction of the pipeline on agricultural land is the fact that there can be **adverse impacts on the soil and environment resulting from the disruption of natural soil processes and properties that have developed over the past few thousand years of soil formation:**

- Trenching and vehicular traffic can result in soil compaction in the surface horizons and subsoil.
- Mixing of topsoil and subsoil can lower organic matter content and soil fertility.
- The volume of soil that crop roots can exploit may be reduced.

These and other factors that affect soil productivity **make restoration to optimal conditions very difficult.**

There are several related issues :

### Compaction

- **There is near universal agreement that compaction of soils results in damage to the soil and decreases yield for some period of time.** The negative effects of soil compaction are magnified when associated with other plant stress situations and therefore the weather pattern is an important variable in how crops respond to compacted conditions.
- **Pipeline installation generally has a time schedule and so installation activities will continue regardless of weather conditions and without consideration of the moisture content of the soil.**

### Separation of soil horizons

- The topsoil (A horizon), subsoil (B horizon), and parent material (C horizon) should be stockpiled separately and replaced in the trench in the order they were before they were removed. **Even if the horizons are replaced in the correct order, there will still be contrasts in the contacts between materials that will affect water movement and root penetration.** There should be no traffic over the stockpiled areas.

### Soil fertility

- The A horizon contains the highest concentration of nutrients so it is important that it be replaced. However, the depth of rooting for corn and soybeans is 5 to 6 feet so proper replacement of the subsoil and parent material is also important.

### Changes in soil biology

- The disturbance will affect the macro and micro fauna and flora.

### Natural drainage

- Soil forming factors have developed this system over the past few thousand years. Pore size and continuity, macro and micro flora and fauna will have been disturbed . **The pipe itself is a barrier that disrupts the natural system of water movement.**

### Surface and subsurface drainage

- After construction generally the surface elevation will be higher due to more material placed on top of the filled trench to allow for subsidence of the fill material. This can result in interruption in the path of surface water flow and develop wet spots as a result of the topographic change. **Subsurface drainage systems can also be affected by breakage and disruption of the system.**

### Changes in soil temperature due to pipeline presence

- Soil temperature will be affected by the presence of the pipeline. **Freezing and thawing cycles will probably be reduced which can affect correction of compaction and will also affect micro and macro fauna and flora. The latter could result in increased potential for crop diseases.**

### Changes in traffic pattern

- If the soil above the pipeline does not freeze this could cause disruption in some field activities such as manure application.

### Rocks brought to the soil surface

- Soils and parent materials that contain rock and boulders could be brought to the surface due to excavation of the trench. They should be removed from the site so as not to cause harm to machinery.

### Weed control issues

- Disturbance will probably create more heterogeneous conditions in the soil which can contribute to increased problems of weed control.

### Loss in soil productivity

- One of the greatest areas of uncertainty relates to the magnitude and duration of productivity loss due to the activities associated with pipeline installation. Productivity loss will vary greatly depending on the soil properties, especially natural drainage, degree of compaction, cropping system, and weather patterns. **Most researchers agree that there will be a loss in productivity but the amount and duration of the loss are dependent on the factors listed above.**